Social Density in Long-term Care Nursing Homes: A Rapid Narrative Review of the Advantages and Disadvantages of Variations of Care Unit Sizes of the Small House model

November 2024

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The physical environment is one of the significant nursing facility characteristics that effect resident outcomes (Millar et al., 2024). In recent years, in many parts of the world, developers and designers of Long-term Care (LTC) facilities have been increasingly adopting the household or small house model of care, particularly for residents with dementia. Calkins (2018) has described the evolution of care from large traditional or medical models with facility wide care, to the development of smaller special care units (SCU) for dementia residents within larger facilities. She goes on to show the evolution to more person-centred care in smaller more flexible generic units for everyone which encompass therapeutic features of the earlier SCU, especially smaller size. Changing demographics within facilities with the proportion of residents with dementia approaching two-thirds of a facility's census is driving this shift to smaller care units for all residents. This study will focus on the sizes of dementia friendly generic care units.

A care unit is defined as a geographic area within a nursing home or Long-term care facility (LTC) with a specific number of residents, managed and cared for by specific staff (Estabrooks et al., 2011). In the household model care units vary in size from approximately 4 to 30 and tend to be self-sufficient in amenities such as lounges, dining and activity areas. In the United States household sizes are estimated to range from 34% for twelve or fewer residents, 37% for medium sized households, and 29% for large households of 20 to 30 (Proffitt, 2017). The care unit is the main zone or 'life space' that residents live in. It is their primary area of functioning. LTC residents spend the majority of their time in the care unit, with most residents leaving the unit less than once per week (Sverdrup, 2021). The care unit is the most critical level when analysing the impact of various environmental factors on resident quality of life. Indeed, one study has shown that the unit size is the most influential and explains most of the variance of the effect of implementing these smaller models (Rosvik, 2014). Care units in nursing homes are clinical microsystems that are the "basic building blocks of interaction where care is provided and quality is achieved or not" (Nakrem, 2015, p.11). Marquardt (2014) found that small-scale environments for residents with dementia result in positive outcomes including improved social abilities, behaviour, and well being. She concluded that they should be adopted whenever possible.

The number of residents in a care unit can be thought of as care unit 'social density', with variation in the number of residents in a unit on a continuum from low to high social density (Morgan & Stewart, 1998). Increasing social density expands the number of people, residents and staff, with whom residents have to cope. However, there is no widely accepted definition on the ideal size or range of sizes for the units or households (Calkins, 2018). The decision regarding the size of care units is critical to the overall design of a LTC facility and will impact construction and operating costs as well as the well-being of residents and staff. Yet there is little evidence-based advice available on the effects of the size variations. Guidance is needed for LTC nursing home designers and developers.

Method

This article is a Rapid Narrative type review of current research and will address the urgent research question of what are the advantages and disadvantages of various household or small house model care unit sizes for persons with dementia relative to resident and staff well-being, resident social abilities, and resident behaviour. Although the focus is on care unit sizes for residents with dementia, the results of the study are applicable facility wide given the overwhelming proportion of dementia residents in LTC facilities. A rapid narrative review is necessary because this is particularly critical now that the COVID pandemic has highlighted shortcomings of the LTC built environment. A more thorough and systematic review is recommended for future research.

No doubt more examples of relative research regarding the impacts of care unit size will surface as focus is brought to this question. Hopefully this rapid narrative review will uncover gaps and limitations in current research and be a foundation to stimulate and inspire new research directed to this important question of the impact of care unit size on resident and staff well-being.

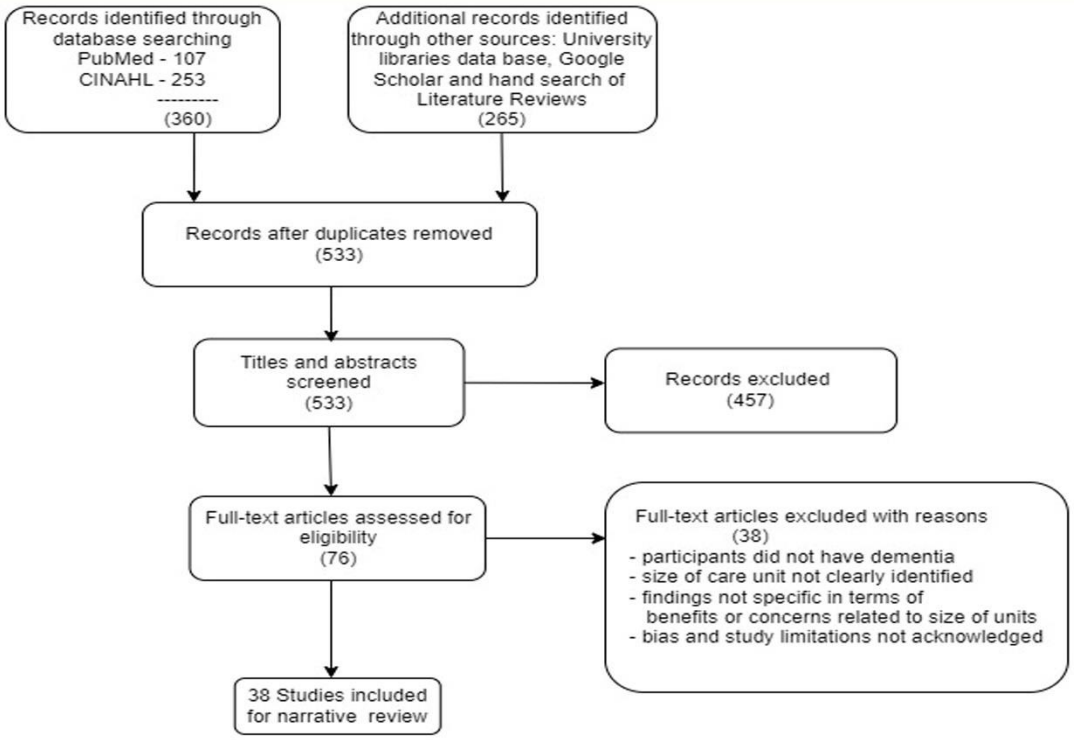
Search strategy

A rapid literature search was conducted broadly using Prisma guidelines for PubMed and CINAHL data bases for a 30-year time frame January 1993 to December 2023. A total of 107 results were identified for PubMed and 253 for CINAHL. In addition, a further 265 records and reports were identified from other sources: Google Scholar, university library data bases, hand searches of reference lists from selected relevant studies and literature reviews. After duplicates were removed, 533 titles and abstracts were screened, and 76 full-text articles were assessed for eligibility. This narrative review is expected to be representative and not exhaustive. Some studies will have been missed and more will surface as this issue of care unit size is stimulated.

See Figure 1.

Journal articles were included if they were in English, referenced LTC or nursing home and small house or group or household, or unit size, were based on residents with dementia, and included relevant findings of advantages and disadvantages related to care unit size.

Articles were excluded if they were not in English, were not based on residents with dementia, were not specific on number of residents in a care unit or if their findings were not relevant to the size of units as a factor in any of the following results: resident or staff well-being, resident social abilities, or resident behaviour. On this basis thirty-eight research studies were selected for narrative review.



PubMed search string: #1: Long term care OR nursing homes AND built environment, AND dementia; #2: Long term care OR nursing homes AND dementia AND care unit size; #3: long term care OR nursing homes AND dementia AND social density.
CINAHL search string #1: Long term care AND small group; #2: Nursing Home AND small group, #3: Nursing home AND social density; #4: Long term care AND social density; #5: Nursing home AND unit size; #6: Long term care AND unit size; #7: Nursing home AND household model; #8: Long term care AND household model.

Figure 1

Typology of LTC care unit sizes

In this review the selected articles have been grouped and summarized according to a three-part typology based on size of units, similar to earlier authors (Adlbrecht et al., 2021; Houben et al., 2023). Care unit sizes in this review were found to cluster as follows: 4 to 10 for Small; 11 to 16 for Medium; and 17 to 30 for Large. Size of Care Unit is a continuum with overlap and is but one factor of the Built Environment.

Results

Results are tabulated into three tables, Table One for Small Size Care Units (4 – 10 residents), Table Two for Medium Size Care Units (11 – 16) and Table Three for Large Size Care Units (17 – 30). Data included in the tables includes the citation, the location by country, the study methodology and time frame, the experimental group size, the types of care unit comparisons in the study, the relevant findings of advantages and disadvantages to residents' and staff's well-being, and residents' social abilities and behaviour.

Table 1: Advantages and disadvantages of Small LTC Care Unit Size (4 – 10 residents)

CITATION	LOCATION	METHOD AND TIME FRAME	EXPERIMENTAL GROUP SIZE	TYPES OF CARE UNIT COMPARISON	ADVANTAGES OF SMALL GROUP	DISADVANTAGES OR LIMITATIONS
Annerstedt (1994)	Sweden	This was a relocation study, at 10 days prior to move, and 6, 12 and 36 months after move.	8-10	Large traditional wards of 30-50 relocated were compared to small group living.	There is less functional decline in residents with mild to moderate dementia though benefits are time-limited and decline over course of the disease.	Residents with severe dementia become more withdrawn if relocated to small group.
De Boer et al (2018)	Netherlands	This study included two cross-sectional observational studies.	6-12	1. Small group and Green Care Farms to Traditional 20+; 2. three small group Nursing Homes	There was more beneficial potential in small care units: higher autonomy, privacy, orientation, routing and domesticity.	Benefits are not automatic, but dependent upon staff initiation and encouragement.
De Rooij et al (2012)	Netherlands and Belgium	This was quasi-experimental with baseline, 6 and 12 months in 2010-2011.	6-8 in Netherlands, 6-15 in Belgium	Dementia small units were compared to traditional of 20+.	In Netherlands higher social and more positive affect were found. Belgium found less negative affect.	In Belgium, feeling at home increased over time in traditional but did not in small units.
Kok et al (2018)	Netherlands	This was an 8-month longitudinal non-randomized relocation study.	7-8	Large Special Care Units of 20-30 were relocated to small unit living.	Small scale living reduced anxiety	
Lee et al (2021a and b)	Sweden and Canada	This study used observational, TESS*, descriptive and focus groups in Canada in 2013 and Sweden 2018.	8-10 beds in Sweden to 12 to 30 in Canada	Dementia residents in small unit living were compared to those in Medium, and Large Care Units.	Residents in small-scale units were less withdrawn, had a higher level of well-being. Small unit size encouraged staff-resident interaction.	
Porter et al (2022)	Canada	This was an observational relocation study, using surveys, at two points in time: 2017 and 2019.	5	In this study residents in 15 bed Special Care Units moved to 5 bed units.	There was no evidence of positive change in residents' behavior and characteristics.	This was challenging for group activities, with some increased negative interactions. Staff were spread thin. Resulting in safety concerns for lower functioning residents.

Table 1 continued

CITATION	LOCATION	METHOD AND TIME FRAME	EXPERIMENTAL GROUP SIZE	TYPES OF CARE UNIT COMPARISON	ADVANTAGES OF SMALL GROUP	DISADVANTAGES OR LIMITATIONS
Reimer et al (2004)	Canada	This study was observational, non-randomized and longitudinal, at baseline, 3, 6, 9, and 12 months.	6-10	Small Special Care units were compared to large traditional wards.	Small care unit residents had enhanced Quality of Life: better ADL, affect, and interest; less anxiety and fear.	More agitated behaviors were found in small groups. All groups had declined at the 12-month assessment.
Te Boekhorst et al (2009)	Netherlands	This study was quasi-experimental with baseline and 6-month reviews over a 2-year study period.	4-6	Dementia small units were compared to traditional units of 20-30 residents.	Small units facilitated Activities of Daily Living (ADL), used fewer physical restraints, and residents were more socially engaged.	There was risk of bias in the selection of small group residents. Small units may not be suitable for all types of residents.
Verbeek et al (2010)	Netherlands	This was a cross-sectional study regarding resident screening characteristics from Apr 2008 to Dec 2008.	6-8	Residents in dementia small units were compared to those in traditional units of 20+ in a psychogeriatric ward.	Small unit residents had higher functional status and cognitive performance.	Risk of bias was evident in the selection of residents for small group living.
Verbeek et al (2012)	Netherlands	Surveys and Interviews were conducted with staff and family Apr 2009-Jan 2010.	6-8	Dementia small unit residents were compared to those in traditional units of 20+.	Small unit residents had more close staff-resident relationships.	There was a risk of inadequate staff back-up, and not enough activities and services.
Verbeek et al (2014)	Netherlands	This study was quasi-experimental at baseline, 6 and 12 months from Apr 2008 to Jan 2010.	6-8	Dementia small unit residents were compared to traditional 20+ psychogeriatric wards.	Small unit residents were more socially engaged, had fewer physical restraints, and used fewer psychotropic drugs.	Small unit residents exhibited wandering and aberrant behaviors. There was a risk of not enough activities.

*TESS: Therapeutic Environment screening scale

Table 2: Advantages and disadvantages of Medium LTC Household Care Unit Size (11 – 16 residents)

CITATION	LOCATION	METHOD AND TIME FRAME	EXPERIMENTAL GROUP SIZE	TYPES OF CARE UNIT COMPARISON	ADVANTAGES OF MEDIUM GROUP SIZE	DISADVANTAGES OR LIMITATIONS
Abbott et al (2017)	United States	This was an Observational study using medical charts and MDS data, visitor logs, and direct observations over a 3- week period between March and May 2013.	16	Residents in a 16-bed dementia Special Care Unit were compared to traditional nursing home residents.	SCU residents had more social interactions, particularly with staff and expressed more pleasure.	Admission criteria excluded late-stage dementia. Interactions were dependent on the initiation of well-trained staff. SCU residents were more anxious.
Afendulis et al (2016)	United States	This study used longitudinal analysis of MDS (Medicaid and Medicare) data from 2005 to 2010.	10-12	Green House model residents were compared with non-Green House Nursing Home residents	Rehospitalizations declined for Green House residents and an absence of decline in clinical quality measures was found in Green House residents	There was Inconclusive evidence of a better quality of life for Green House residents.
Dyer et al (2018)	Australia	This cross-sectional study used facility records, assessment scales and questionnaires to collect data from Jan. 2015 to Feb. 2016.	≤15	Dementia residents in clustered domestic units of 15 beds or less were compared to those in standard residential aged care.	Clustered domestic unit residents had better quality of life and lower hospitalization rates and emergency department visits.	
Hermer et al (2017)	United States	This observational study consisted of 8 hours per resident and 4-7 hours per staff from baseline in May 2015 to summer of 2016.	16	Residents in 16 bed households with on-unit dining were compared with larger 20-30 bed units that had not adopted as much culture change.	Residents in household units were less idle, had more social and task-oriented interactions with staff, and expressed more positive affect especially in dining areas.	The study excluded residents with advanced dementia.
Kane et al (2007)	United States	This quasi-experimental, longitudinal study used interviews with residents and staff from 2003 to 2004.	10-12	Green House model residents were compared with residents in two traditional sites.	Green House residents were found to have equal to or somewhat higher emotional well-being, and lower decline in late-loss ADL	Green House residents were less involved in organized activities. The study was limited by the Hawthorne effect.

Table 2 continued

CITATION	LOCATION	METHOD AND TIME FRAME	EXPERIMENTAL GROUP SIZE	TYPES OF CARE UNIT COMPARISON	ADVANTAGES OF MEDIUM GROUP SIZE	DISADVANTAGES OR LIMITATIONS
Keefe et al (2017)	Canada	This was a research study and post occupancy evaluation of the adoption of the Household model in Nova Scotia from 2012 to 2014.	9-16	Three models of care compared the full Household model with the augmented (limited) model and traditional units.	Quality of Life of residents is enhanced by objectives of the Household model, i.e. home-likeness and the focus on relationships and bonding with staff.	Implementation of the Household model was challenging, mixed, and partial. There were increased costs due to greater square footage in the Household units.
Lee et al (2016 a and b)	Canada	These two studies used observational, descriptive and focus groups in Canada. Assessments were made over one year (2012 – 2013).	12	Medium size care units of early and middle stage dementia residents were compared to similar residents in traditional large units of 30.	Residents in medium size settings had increased social interaction, positive behaviours, affect, well-being and better wayfinding. There were also enhanced quality of staff-resident relations and staff satisfaction.	This study limited analysis to mobile residents with early and moderate dementia.
Milke et al (2009)	Canada	This observational study of 5 Woodside Place model households used surveys, TESS*, and behavior mapping over 2-day periods.	12 and 20	Two large size dementia 20 bed units were compared with 3 medium sized dementia 12-bed units.	The study found better staff-resident interactions and ADL functioning in Medium sized households.	Even in medium size units, residents seldom engaged when staff were not around. There were more in-house group activities in 20 bed units.
Molony et al (2011)	United States	In this longitudinal relocation study data was collected at baseline, 1, 3, and 6 months.	15	Residents moved from a 100-bed nursing home to 5 medium sized dementia household units.	Residents of the medium size units were less dependent, had improved ADL, a greater sense of freedom and increased relations with staff.	Late-stage dementia residents were excluded. The medium size units had fewer activities.

Table 2 continued

CITATION	LOCATION	METHOD AND TIME FRAME	EXPERIMENTAL GROUP SIZE	TYPES OF CARE UNIT COMPARISON	ADVANTAGES OF MEDIUM GROUP SIZE	DISADVANTAGES OR LIMITATIONS
Roberts (2016)	Canada	This case study focused on staff and was observation and interview based over 8 weeks.	8-12	This study examined staff perspectives of four newly built Households in Nova Scotia.	In the new medium size households some increased staff satisfaction was found but tensions existed regarding the risk verses autonomy balance for residents.	Staff did express Concerns regarding management support, isolation, increased workloads and staff shortages.
Smith et al (2010)	Australia	Observation and environmental assessments were used in this relocation study over 8 months.	15	This study involved the move of dementia residents from traditional nursing homes to smaller 15 bed dementia specific household cottages.	Residents were more engaged and less distressed in the new households. The lower number of residents made life easier as residents had fewer persons to interact with.	Positive results were dependent to some degree on improved staff training.
Yoon, 2013	United States	This retrospective, longitudinal analysis used MDS data from 2004 to 2009.	10-12	Green House residents were compared with traditional nursing home residents.	Green House residents showed a lower increase in probability of not being socially engaged.	Green House residents showed increased aggressive behavior and negative mood (depression) over time. This was possibly due to insufficient activities.
Zeisel et al (2003)	United States	This study measured the association of design features of Special Care Units with behaviour using the E-B model tool*	7-15	Design features of 15 SCU facilities were analyzed for association with behavioral health measures for 427 residents.	Residential character, defined as 7-15 residents was associated with decreased social withdrawal, lower levels of aggression, and fewer psychological issues.	Several factors besides size contributed to these benefits: i.e. privacy, personalization in bedroom and home-like ambiance.

*E-B: Environment-Behavior Factors Model;
*TESS: Therapeutic Environment screening scale

Table 3: Advantages and disadvantages of Large LTC Household Care Unit Size (17 – 30 residents)

CITATION	LOCATION	METHOD AND TIME FRAME	EXPERIMENTAL GROUP SIZE	TYPES OF CARE UNIT COMPARISON	ADVANTAGES OF LARGE GROUP SIZE	DISADVANTAGES OR LIMITATIONS
Campo and Chaudhury (2011)	Canada	This observation study in 2009 used interviews and environment assessments.	1. 17-18 2. 26	Two dementia Special Care Units, one of 18 and the other of 26 residents were involved in this study.	More residents in larger group size provided greater opportunities for informal social interactions in small clusters and pairs	Residents in the smaller of the two SCUs were in later stages of dementia and less mobile.
Carnemolla et al (2021)	Australia	This relocation study used four staff focus groups in 2019 following a move of residents in 2017.	16-30	Residents moved from a large 86 bed traditional mental health facility to 4 households.	More choice and diversity of spaces and activities supported opportunities for socialization in dining in smaller clusters	Greater distances an issue particularly for residents with mobility and wayfinding challenges
Caspi (2014)	United States	This observation case study used meetings with staff from Aug 2007 to June 2008.	33	Two Assisted Living dementia Special Care Units, 1 low and 1 high functioning were studied.	Staff regularly directed, guided, or physically led residents to their desired destinations	Wayfinding issues: residents dependent on staff to find own rooms wc and amenities
Cioffi et al (2007)	Australia	This relocation case study used focus groups of family and staff 3-6 months after move.	21	Residents moved from an older traditional unit to a more home-like dementia Special Care Unit.	In the home-like unit residents were less agitated, slept better, were more engaged, gained weight, and moved more.	Staff indicated that the more spacious layout required longer distances to walk.
Doyle et al (2011)	United States	In this case study using observation and staff interviews data was collected over 12 months.	20	This was an assisted Living dementia household divided into 2 wings.	Staff can facilitate or limit social interactions by encouraging nested social groups through purposeful seating in dining and lounge areas.	Wayfinding needs to be addressed. Staff focused on task efficiency at the risk of institutional creep.
Houben et al (2023)	Netherlands	This retrospective cohort study focused on ward factors of COVID-19, Sep 2020 - June 2021.	$\leq$10 11-20 $\geq$21	Data was collected from 190 facilities on ward-level factors.	This study highlighted the need to distinguish between facility size and ward size in COVID-19 research.	Large ward size was one of the factors that increased the risk of a COVID-19 outbreak.
Moore (1999)	United States	This was an observation and survey of social life in dining areas June 1996 to June 1997.	24	This was an assisted living dementia Special Care Unit divided into two 12 bed clusters.	There were opportunities for residents to form social cliques and confidant groupings within clusters especially in dining areas.	Staff were primarily task-oriented. Residents had wayfinding issues.

Table 3 continued

CITATION	LOCATION	METHOD AND TIME FRAME	EXPERIMENTAL GROUP SIZE	TYPES OF CARE UNIT COMPARISON	ADVANTAGES OF LARGE GROUP SIZE	DISADVANTAGES OR LIMITATIONS
Morgan and Stewart (1998)	Canada	This quasi-experimental study used EBIC observation to code behavior over 16 to 17 months.	20	SCU residents moved from large secure units of high social density 69 – 81 into smaller low social density 20 bed units.	Unit density was an important determinant of behavior in residents with dementia. Low density reduced disruptive behavior, and increased nondisruptive behavior.	Residents in late stages of dementia were excluded. The study lacked random assignment but did use baseline matching of dementia.
Morgan-Brown (2014)	Ireland	The observation based ATOSE* tool was used in this quasi-experimental renovation study in 2013.	18	Residents and staff, in two dementia nursing homes were observed pre and post move from traditional units to households.	Residents and staff in households were more engaged and interactive with others and made better use of communal spaces.	Improvements mostly dependent upon staff interventions, especially the new role of homemaker.
Palm et al (2019)	German	This observational, longitudinal study used staff questionnaires from 2012 to 2014.	Large >15 2. Small ≤15	People studied were those with severe dementia in 31 large and small care units in 16 facilities.	Large care units were favoured over small units on the 'impact of time on Quality of Life'.	Results may be related to staff work stressors being less in large care units.
Proffitt (2017)	United States	This study used Interviews and observations and developed the HPEAA* tool.	1. 15-17 2. 16-21 3. 17-23	16 Households on 3 sites were involved.	Staff satisfaction was highest in the larger households which best fostered teamwork, good backup and less feelings of isolation.	There was a sense of overcrowding and institutional feel in larger households. Dining ambiance was critical to a 'homelike' feeling.
Wada et al (2019)	Canada	This longitudinal relocation study used interviews with residents, staff and family at 5 points over two years June 2014 to May 2016.	20	Residents moved from two older traditional facilities to a 260-bed building with 13 households of 20 beds. All of the households were divided into 2 wings, but shared dining.	The variety of small lounges facilitated social interaction. However, some staff and residents missed the larger lounge area and large group activities.	For some the large area of households felt institutional and hotel-like. Staff were spread thin with little time for relating with residents due to heightened workload.

*HPEAA: Household Physical Environment Affordances Assessment; EBIC: Environmental-Behaviour Interaction Code
*ATOSE: Assessment Tool for Occupation and Social Engagement;

For narrative purposes these tabled results have been further grouped within each size type by themes of benefits followed by findings of disadvantages. See Figure 2.

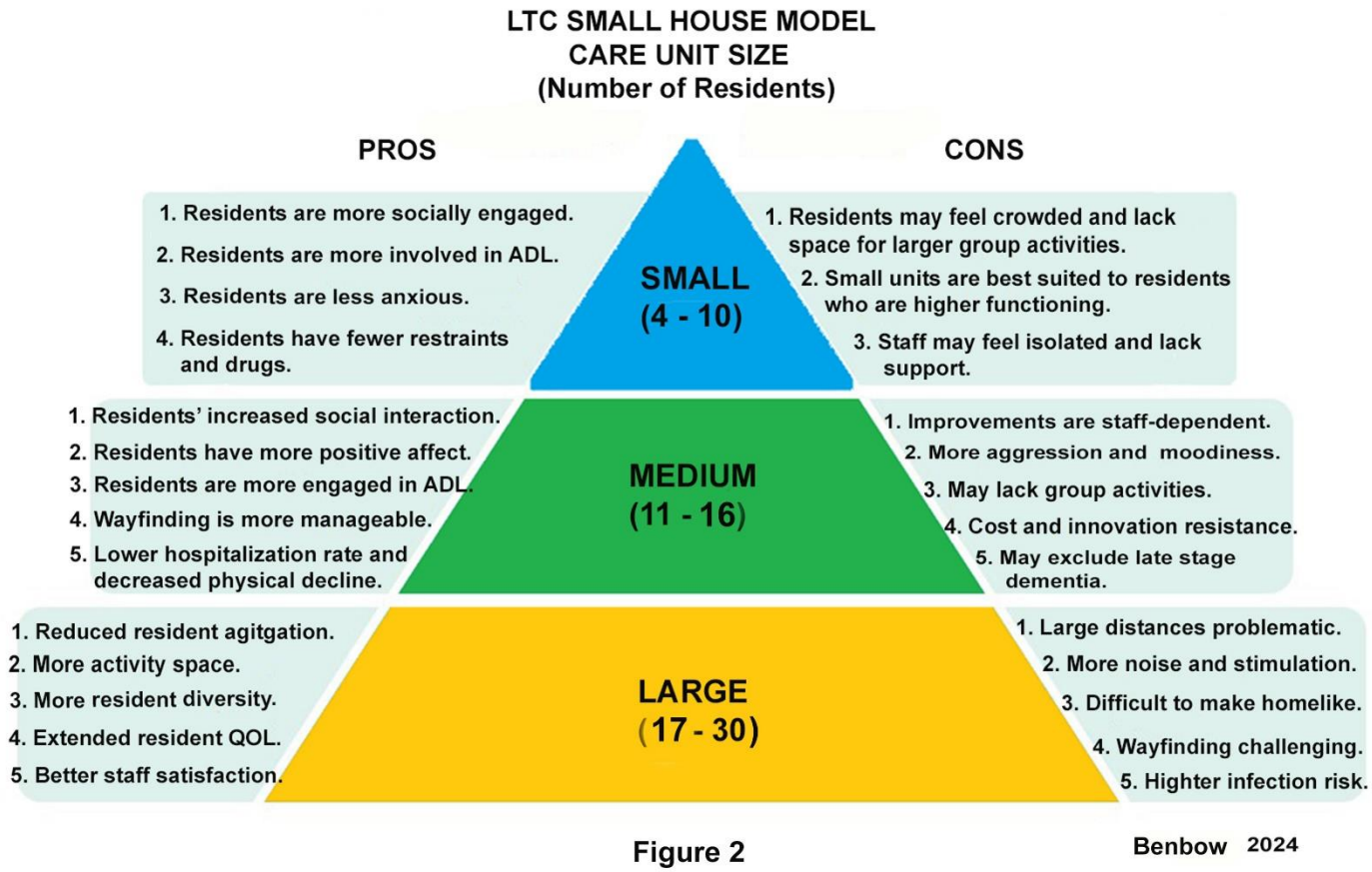


Figure 2 Benbow 2024

Results of small care unit size of 4 to 10 residents (table 1)

Of the twelve studies selected for review in the small care unit size, three were relocation of residents to smaller units, while nine were comparisons with larger traditional units. Eleven studies found positive benefits in the small size units for residents and/or staff.

Benefits of Small Group size care units (4 – 10):

1. Small care unit residents were less withdrawn, more socially engaged.

One study compared small size units of 8 – 10 beds in Sweden with medium and large size units in Canada and found that residents living in the small units of Sweden showed less withdrawn behaviours, were more engaged and had a higher level of well-being than their Canadian counterparts in larger care units (Lee et al., 2021). In the Netherlands, where small-scale households of 6 – 8 residents made up 25% of Care Units in 2009, two studies found that residents in the small-scale units were significantly more socially engaged (Verbeek et al., 2010; 2012, 2014; de Rooij et al., 2012).

2. Small care unit residents are more engaged in Activities of Daily Living (ADL).

In Verbeek's study nursing staff were highly attentive to the needs of residents and encouraged them to participate in daily household activities (Verbeek et al., 2010, 2012, 2014). Similar results of residents having more to do were found in several other Dutch studies (de Rooji, 2012; te Boekhorst et al., 2009; de Boer et al., 2018). An early Swedish relocation study found that residents with mild to moderate impairment become more active and outgoing in smaller units (Annerstedt,1994). A Canadian study found that although all residents experienced decline, residents in smaller units showed better ADL function (Reimer et al., 2004).

3. Small unit residents had better affect and were less anxious.

Reimer (2004) found that residents in smaller units had better affect with increased interest and less anxiety/fear. Residents in small group living in Holland and Belgium had more positive affect than those in traditional settings (de Rooji, 2012). Another study in the Netherlands found that residents who moved to small scale units became less anxious than residents who stayed on the large-scale units (Kok et al., 2018).

4. Residents in small care units were subject to fewer physical restraints and drugs.

Studies found that residents in small group living were subject to fewer physical restraints and psychotropic drugs (te Boekhorst,et al., 2009; Verbeek et al., 2014)

Concerns or disadvantages of Small Group size care units (4 – 10):

1. Limited space may cause crowding and reduced in-house activities.

One study that did not find positive benefits for smaller care unit residents involved moving residents from three 15 bed Special Care Units to nine small-scale 5 bed households. Findings were that residents had increased negative interactions possibly because of closer proximity and nowhere to get away from each other. This study also found insufficient amenity area in the small care units and that the smaller dining areas were challenging for group activities (Porter et al., 2022). The authors of another study pointed out that residents in small units displayed more physically non-aggressive behaviour such as aimless wandering after 12 months and more aberrant repetitive motor behaviour such as picking and handling than the residents in the larger traditional wards. The authors suggested that this may be a result of residents' need for stimulation and that small-scale living facilities may be at risk in providing not enough opportunity for activities due to the small unit size (Verbeek et al., 2014). The finding of increased wandering and agitation in small units is supported by another study (Reimer et al., 2004).

2. Benefits of small care units may be limited to early and mid stage dementia.

A study found that at baseline residents living in small-scale units had significantly higher functional status and cognitive performance compared with residents living in regular wards. This suggested to the authors that selection had occurred in choosing

residents for small-scale units who were in an earlier stage of dementia and had the best cognitive and functional abilities (Verbeek et al., 2010). Similar findings in another study caused the authors to note that group living homes generally only admit a certain type of resident which raised the question of whether small group living care is suitable for all people with dementia (te Boekhorst et al., 2009). Annerstedt (1994) noted that the degree of dementia is crucial in that relocation of severely demented residents generally results in an increase in passive withdrawal, while residents with mild to moderate impairment become more active and outgoing. Consequently, residents for relocation to smaller units were selected based on 'suitability'.

3. There were more staff issues and pressures in small units.

In the Porter study (2022) staff were concerned that they were spread thin covering more than one Unit and could not watch all residents particularly during dining when there was a risk of residents choking. Some staff felt that the smaller units were more suitable for higher functioning residents, and unsafe for lower functioning ones. Similar concerns regarding staff being spread too thin were noted by a Dutch study, namely that nursing staff worked alone much of the time, resulting in residents being left alone because staff had to help other residents or assist another house. Staff had to make decisions and manage behaviour issues without much support. This requires a more mature skill set. This study suggests that larger units of 10 to 12 could address this shortfall and improve financial feasibility (Verbeek et al., 2012). Another study pointed out that the benefits to residents are not automatic but dependent upon nursing staff prompting and activating engagement in activities and social interactions (de Boer et al., 2018).

Results of medium care unit size of 11 – 16 residents (table 2)

Fourteen studies were reviewed with medium care unit size as a factor. Most of these studies were comparisons with larger traditional units; two were renovation/relocation studies. Like the studies of smaller size care units these studies of medium size units generally found improved well being for residents when compared with larger units of greater social group density.

Benefits of medium care unit size (11 – 16)

1. There was Increased social interaction and engagement in medium size units.

The Canadian part of the Canadian Swedish study focused on a comparison of the two Canadian based settings, that is, the medium-scale 12-bed home-like dementia settings compared with the large-scale units of 30 beds. Results suggest residents in the 12-bed settings had increased social interaction and engagement and showed continuous improvement in positive behaviours and well-being (Lee et al., 2016a and b). Two other Canadian studies found similar improvements in staff-resident interactions and relationships in medium sized care units compared with larger ones (Milke et al, 2009; Keefe et al., 2017). An Australian relocation study found similar results with even a

modest lowering of social group density from 16, 19, and 20 plus beds to units of 15. After the move resident engagement increased over several months (Smith et al., 2010). Four US studies confirmed improved social interaction results for medium sized units. (Abbott et al., 2017; Hermer et al., 2017; Molony et al., 2011; Zeisel et al., 2003).

2. Medium size unit residents have more positive affect than in large units.

The Canadian Swedish study found residents in the 12-bed units were content or very happy during one-quarter of the observation time, while the larger unit residents were content in only 4% of the observation time (Lee et al., 2016a and b). Another study found residents in 16 bed households displayed positive affect more than twice as often as residents in the larger and more traditional units, especially in the dining area (Hermer et al., 2017). Persons living in medium sized residential environments with privacy and personalization in bedrooms expressed lower levels of aggression, especially verbal aggression and fewer psychological problems. The lower number of residents per household reduced the number of other residents and staff that residents needed to interact with, resulting in less distress (Zeisel et al., 2003; Smith et al., 2010).

3. Residents in medium size units are more engaged in domestic activities.

A US relocation study found that residents in 15 bed units demonstrated less dependence and improved ADL function over time (Molony et al., 2011). Another study compared residents in four 10 – 12 bed Green House Units with randomly selected residents from two traditional sites. The Green House residents had better emotional well-being and a lower incidence of decline in late-loss ADL (Kane et al., 2007). A Canadian study of Woodward Place units supports these findings. Two large size 20-resident households were compared with three medium size 12 resident units. The main difference found was that residents in the 12 bed units scored better on staff interactions with residents and had greater participation in ADL activities such as helping with housekeeping and cooking (Milke et al., 2009). A US study also found that residents in 16 bed medium size care units were less idle and had more task-oriented interactions (Hermer et al., 2017).

4. Wayfinding was more manageable in medium size care units.

In the Canadian Swedish study staff indicated that residents appreciated the scale and familiarity of the medium size care units. In particular residents were close to resources and amenities which made wayfinding manageable and allowed staff to stay close with residents. (Lee et al., 2016a and b). The medium size of the care units resulted in walkable distances, and good sight lines for both residents and staff. Residents could see their destinations easily so navigation is facilitated.

5. There was a decrease in physical decline and lower rehospitalization rates in medium size units.

Green House units in the US experienced slight declines in bedfast residents, catheterization, pressure ulcers. and fewer 30-day hospital readmissions. (Afendulis et

al., 2016). And an Australian study compared the outcomes and costs of clustered domestic (fewer than 15) and standard models of residential care. Results were that residents in the medium size units had significantly better quality of life and lower hospitalisation rates and emergency department presentations. These benefits were achieved without an increase in operating costs (Dyer et al., 2018).

Concerns or disadvantages of medium care unit size (11 – 16):

1. Improvements in well-being in medium size care units was staff-dependent.

The Woodward Place study also found that residents were seldom engaged when staff were not around (Milke et al., 2009). The Australian relocation study found that combining staff training with reduced social group density was a major factor increasing resident engagement (Smith et al., 2010).

2. There were higher rates of aggressive behaviors and negative mood in medium size units.

A study that compared Green Home residents from nine households with traditional home residents found that the Green House residents had a higher linear rate of aggressive behaviors and a higher slope of negative mood with a higher rate of increase in depressive symptoms over time (Yoon, 2013).

3. There was a lack of organized group activities in medium size units.

A lack of organized group activities may account for some of the increased aberrant and aggressive behavior in medium size care units. Organized group activities are underemphasized in Green Houses (Kane et al., 2007). The study of Woodside Place model households also found that the larger 20 bed households had more in-house group activities than the 12 bed households (Milke et al., 2009). Similarly, another study found that some residents missed the formal structured recreational activities of larger units (Molony et al., 2011). Also, amenity spaces may not be large enough to accommodate large group activities within medium size households.

4. Concerns were found regarding additional cost and innovation resistance for medium size units.

The study of the implementation of the household model in the Canadian province of Nova Scotia showed that support of the household model enactment was challenging, mixed and partial. Also, the new household model had a larger footprint per bed (671.2 square feet/bed versus 877.4 square feet/bed) resulting in increased cost of construction (Keefe et al., 2017). Another study in Nova Scotia looked at four newly build 12 bed households. Issues focused on staff concerns regarding communication, isolation, increased workloads and staff shortages. Staff indicated they were challenged by the reduction in middle management and shift to added responsibilities for household

staff in terms of meal preparation and scheduling. Staff felt more on their own particularly during evening and night shifts when coverage was thin (Roberts, 2016).

5. Some medium size care units exclude late-stage dementia residents.

One study specifically ruled out residents with advanced dementia {Hermer et al., 2017). In another study residents were excluded if they were unable to provide assent or required a proxy decision-maker or if they had an unstable or terminal health condition (Molony et al., 2011). In yet another study residents were only accepted if they were in the early or middle stage of Alzheimer's disease or a related dementia, and able to ambulate with or without an assistive device (Lee et al., 2016a). In one study residents had to be able to follow one step directions, and be able to function in a small/group setting, or to focus on an activity or task for at least 10 minutes with one person assisting (Abbott et al., 2017).

Results of large care unit size of 17 – 30 residents (table 3)

Twelve studies were included in the large care unit size review. Four of the studies in the large size household grouping were comparisons with more traditional larger units (greater than 30 residents). Two studies compared large size units with medium size units. One study focused on the impact of COVID for all three Household or Small House size types.

Benefits of large care unit size (17 - 30) of the Small House model:

1. Decreased Social Group Density relative to larger traditional units reduced agitation in large care units of the Small House model.

Social group density was studied in a Canadian relocation study that followed 53 residents who moved from high density units of 69 – 81 beds to lower density units of 20 beds. The main environmental distinguishing feature was relative density. There was a greater decrease in the rate of disruptive behavior over time in the lower density group: i.e. in the residents who moved to 20 bed size units (Morgan and Stewart,1998). An Australian study of relocation to a 21 bed Special Care Unit found that a tranquil atmosphere was achieved with increased space for residents so that they disturbed each other less. They were less agitated, sleeping better, and more engaged in activities (Cioffi et al., 2007). An Irish relocation study found residents of 18 bed households spent significantly greater time engaged and interactive, talking to others or interacting with something in the environment (Morgan-Brown and Gill, 2013).

2. Large size care units provide more space for in-house group activities.

Some large size units were found to provide adequate space needed for wandering and for a variety of gathering places, increased activities and amenities. An Australian relocation study of residents moving from an 86-bed mental health facility to care units of 16 to 30 residents reported that having varied and more shared open spaces changed the way residents connected socially (Carnemolla et al., 2021).

3. More opportunities were found for diverse relationships and clusters in larger size care units.

An early study of a large 24 bed Special Care Unit which was subdivided into two wings found that cliques and confidants formed especially with small tables and seating areas (Moore, K., 1999). A study that looked at a large 20-bed unit found that small, nested social groups formed. The majority of social interactions happened in the dining area, but the nested social groups extended to other activities and amenities (Doyle et al., 2011). A study that compared a large 26-bed special care unit with a 17-bed special care unit found that the larger size unit's residents had greater frequency and overall number of social interactions. The authors reasoned that having a greater number of people in a defined space increases the probability of interaction (Campo and Chaudhury, 2011).

4. The impact of time on quality of life of residents favoured large care units.

A German three-year longitudinal observational study of people with severe dementia attempted to answer the question of whether resident Quality of Life (QOL) is associated with the type of care unit they are living in. Large Care Units (more than 15 beds) were compared with smaller ones. The main finding was that the impact of time on QOL of residents with severe dementia depends on the care unit type, with large units favoured. The authors speculate that this unexpected finding may result from staff in large care units being better organized than those in small units, particularly in terms of work stressors, turnover, and staff-resident ratios. They suggest that care unit types and sizes need to be explored further in future research in terms of their impact on resident QOL (Palm et al., 2019).

5. Staff satisfaction was highest in large size care units.

Some other research supports the suggestion in the Palm study above that staff are better organized in large size household care units and are more satisfied compared to the smaller and medium size ones where staff can feel isolated and not as much a part of a team. In a study that compared 16 households varying in size from medium to large, staff turnover rate was lowest in large households where staff satisfaction was the highest. The authors found that the organization of staff into households fosters teamwork, particularly in the larger units (Proffitt, 2017).

Concerns or disadvantages of large care unit size (17 - 30) of the Small House model:

1. Large distances can be challenging for staff.

Although staff satisfaction has been found to be higher in large size care units, some studies found staff challenges in the greater distances in the large size units compared to the smaller and medium size ones (Lee et al., 2021; Carnemolla et al., 2021; Cioffi et al., 2007). The Irish study (18 residents per unit) found that a good portion of residents' interactive behavior was dependent upon staff facilitation (Morgan-Brown and Gill,

2013). In one study staff and residents were so spread out that some residents felt isolated and challenged by the difficulty of finding staff in the hallways and lounges (Wada et al., 2020). Institutional creep with increased focus on task-oriented routines is also a risk for staff (Moore, K., 1999; Doyle et al., 2011).

2. Increased noise and overstimulation were a concern in large size care units.

Larger number of residents can magnify the amount of noise stimulation and distractions particularly in the upper range of the large size if they are not carefully subdivided (Lee et al., 2021). Large dining areas are especially over stimulating to vulnerable residents who can become anxious and agitated.

3. Large care units were difficult to make home-like.

The overall area of large care units and size of amenity rooms can lack warmth and coziness. They may appear hotel like, with large dining areas more like cafeterias or restaurants. A Canadian study examined the perceptions of home after the move of residents from two older traditional facilities to a new seven-storey 260-bed building with thirteen households of 20 resident rooms divided in two residential wings with a spacious central living area. Some participants felt the bigness and spaciousness of the new setting made it feel institutional rather than homelike (Wada et al., 2020).

4. Wayfinding was a major risk in large size care units.

Studies of large care units found that the complexity of navigation and wayfinding was difficult for residents particularly for those with mobility challenges (Carnemolla et al., 2021; Lee et al., 2021; Doyle et al., 2011; Moore, K., 1999). This Wayfinding issue was further explored in a study examining the effect of space disorientation in two large Special Care Units in the US. Residents had difficulties finding their own rooms, public and private bathrooms, activity and dining rooms, dining table and seat. Residents were quite dependent on staff for navigational assistance. The author recommends smaller households such as the Green House model where destinations such as communal spaces are immediately visible from the resident's room (Caspi, E., 2014).

5. COVID-19 risk increased with care unit size.

In a comparison of three care unit size types, infection spread increased with care unit size. The study in the Netherlands reviewed ward-level factors in 190 facilities. Data was collected on ward size ($\leq$ 10 beds versus 11 - 20 beds versus $\geq$ 21 beds). The number of beds was a level-1 predictor of a COVID-19 outbreak. Large ward size ($\geq$ 21 beds) was associated with increased odds of COVID-19 outbreak compared to small ward size (< 10 beds) (Houben et al., 2023).

Discussion

The research question was to determine what are the advantages and disadvantages of various household or small house model care unit sizes for persons with dementia relative to resident and staff well-being, resident social abilities, and resident behaviour.

This narrative literature review has confirmed that unit size is a major factor related to improved benefits in LTC facility care units for dementia residents (Morgan & Stewart). Benefits in all three size types include improved social relations, positive affect and less disturbed behavior. The pros and cons for the three types of care unit sizes as detailed thematically in the Results section should be of interest to LTC developers and designers. These results show that despite the positive results there are certain issues and mitigations necessary for each of the three size types.

Small care unit size (4 – 10)

1. Given the limited space of small care units, it is important to respect residents' differing needs for privacy and for group activities. Some residents may find the small intimate grouping lacking in diversity, too close for comfort, and lacking in privacy. Residents who need more wandering space and opportunities may feel claustrophobic and agitated. Some may show more non-aggressive behaviour such as aberrant repetitive picking and handling. There is some indication of a lack of organized group activities due to limited staffing and lack of teamwork.

2. There is a need to be sensitive to residents' stage of dementia. Small care units may be best suited to residents who are higher functioning and relatively cognitively intact. Residents with severe dementia tend to become more withdrawn if relocated to a small group. Lower functioning residents may not be able to benefit from activities such as more independence in ADL and helping with food preparation.

3. Staff issues need to be recognized and support augmented. Staff-resident relationships are enhanced in smaller care units but improvements to resident well-being are mostly dependent upon staff initiation and encouragement. Staff in small care units may find the isolation and lack of close support stressful. There may be greater risk to residents, particularly lower functioning ones, during a crisis or heavy care situation when backup is lacking.

Medium care unit size (11 – 16)

1. Like the small care units, attention needs to be paid in the medium size units to the changing staff roles involving increased responsibilities in the care unit and less immediate management support relative to larger care units. And the need for specialized training to support staff in initiating and encouraging resident interaction requires resources and continued input.

2. There is a need to ensure opportunities for group activities in the medium size units. If lounge and activity spaces are insufficient for group activities within households then consideration could be given to easily accessed shared activity areas between households.

3. There is concern that there may be additional capital and operating costs due to increased space in medium size units to provide inhouse amenities such as dining, lounges, and utility areas. These could be mitigated to some degree by a reduction in

common areas distant from the units and by sharing utilities between two or three households.

Large care unit size (17 – 30)

1. The greater area of large size care units makes them prone to institutional creep. Task priority over relationships with residents can decrease quality of life for residents. Staff thinning with greater distances to cover can put residents at risk and staff under stress to get the job done. Attention is needed to Interior Design to make large care units more home-like and less institutional in feel and ambiance. And noise needs to be mitigated, particularly in large amenity areas such as dining.

2. Wayfinding is a major issue with the large care unit size and needs well thought out mitigation, landmarks, cues, and legible rooms.

3. Infection risk increases with higher numbers of residents, so the larger the care unit the greater the risk: this requires heightened diligence in monitoring and preventive measures.

A major solution to all three concerns with large size care units would be to limit care unit size to the lower end of the range, and to divide large size care units into self-contained wings with their own smaller amenity areas, especially dining.

Limitations

Studies of the household or small house model have generally not focused on the influence of care unit size or social group density on resident well-being and Quality of Life (Adlbrecht et al., 2021). As a rapid narrative review this article has gathered representative studies selected and summarized for trends and possible effects of care unit size. However, it is limited in terms of search strategy. It is not a Systematic review so is not exhaustive. Quality of existing research of the household model and small house care units has been challenged by the difficulty of achieving a high quality of research methodology. Also, most studies are not focused on just the one factor of size and its particular effect on resident and staff well-being. It is challenging to isolate just one factor of the built environment when so much is interrelated (Millar, 2024). Much of the available research uses traditional Nursing Home wards as the control group. There are not many studies yet that compare care unit sizes within the variety of sizes of the household or small house model itself. More attention needs to be paid to type and severity of dementia (Pywell et al., 2023; Molony et al., 2011; Fleming & Purandare, 2010). Also, social group density is just one factor in crowding and does not account for social space density, which needs to be studied as well: i.e. the amount of space or area allocated per resident in a care unit (Morgan & Stewart, 1998). And as Bowes and Dawson (2018) point out, the design of the physical environment alone will not be fully effective without a suitable model of care with adequate staffing.

Conclusion and Future research

Choosing care unit size is a basic design decision in the development of a care facility (Marquadt, 2014). Clearly every care unit size will be a compromise with pros and cons. Care unit sizes need to be flexible enough to target a variety of residents including those with somatic and dementia needs. For now, there is general agreement that unit size is a significant factor that can be limiting or facilitating and that there is no one care unit size that suits all residents' needs. This article has highlighted some of the research findings on benefits and disadvantages of small and medium and large sizes of LTC household and small house care units. These pro and con factors should be of use to developers and planners in determining the implications of these basic building blocks of LTC facilities. And with this awareness, mitigating steps can be incorporated. **Based on the results of this review and concerns expressed we can recommend a range of around 10 to 16 residents per care unit with mitigations as suggested, particularly for smaller and larger care unit sizes.** Hopefully this rapid narrative review will stimulate more studies focused on care unit size and social group density and its interrelationship with other built environment factors and delivery of care.

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